



National Voluntary Laboratory Accreditation Program



CALIBRATION LABORATORIES

NVLAP LAB CODE 200976-0

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

Transcat – Phoenix 8240 S. Kyrene Road Suite 107 Tempe, AZ 85284 Mr. Michael Sublett Phone: 800-828-1470 Fax: 800-395-0543 E-mail: msublett@transcat.com URL: http://www.transcat.com	Parameter(s) of Accreditation Dimensional Electromagnetics – DC/Low Frequency Time and Frequency Mechanical Electromagnetics – RF/Microwave Thermodynamic This laboratory is compliant to ANSI/NCSL Z540-1-1994; Part 1. (NVLAP Code: 20/A01)
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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC)^{Notes 1,2}

Measured Parameter or Device Calibrated	Range	Uncertainty ($k=2$) ^{Note 3,9}	Remarks
DIMENSIONAL			
LENGTH and DIAMETER (20/D05)			
Micrometers – Outside, Inside, Depth Field calibrations available ^{Note 4}	0.05 in to 0.4 in 0.4 to 40 in	27 μ in 19L μ in + 10 μ in	Comparison to Gage Blocks
Calipers – Outside, Inside, Depth Field calibrations available ^{Note 4}	0.05 in to 0.4 in 0.4 to 40 in	60 μ in 19L μ in + 60 μ in	Comparison to Gage Blocks
Anvil Flatness Field calibrations available ^{Note 4}	0 in to 1 in	4.7 μ in	Optical Flats
Dial Indicators Field calibrations available ^{Note 4}	0.01 in to 0.4 in 0.45 in to 3.0 in	7 μ in 5.3L μ in + 17 μ in	Gage Blocks with Surface Plate
Height Measuring Equipment	0.01 in to 8 in 8 in to 40 in	3.4L μ in + 17 μ in 4.3L μ in + 15 μ in	Gage Blocks with Surface Plate
Height Measure	0.01 in to 6 in 6 in to 12 in	2.6L μ in + 24 μ in 4.4L μ in + 14 μ in	Gage Blocks with Surface Plate

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Measured Parameter or Device Calibrated	Range	Uncertainty ($k=2$) <small>Note 3,9</small>	Remarks
Length Measurement – Single Axis	0 in to 10 in	$8.0L \mu\text{in} + 21 \mu\text{in}$	Super Micrometer and Gage Blocks
Outside Diameter – Cylindrical Gages	0.01 in to 2 in	20 μin	Super Micrometer
THREADED PLUG and RING GAGES (20/D14)			
Thread Plugs			
Outer Pitch Diameter	0 in to 2 in	76 μin	Comparator and Thread Wires
Major Diameter	0 in to 2 in	20 μin	Super Micrometer

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty ($k=2$) <small>Note 3,5</small>	Remarks
ELECTROMAGNETICS – DC/LOW FREQUENCY				
VOLTAGE/ CURRENT CONVERTER (20/E01)				
Sine Wave Flatness Field calibrations available <small>Note 4</small> (0.3 V to 1 V, 50 Ω)		10 Hz to 1 MHz 1 MHz to 10 MHz 10 MHz to 30 MHz 30 MHz to 50 MHz 50 MHz to 80 MHz 80 MHz to 100 MHz	0.073 % 0.14 % 0.39 % 0.79 % 1.6 % 2.4 %	Agilent 11050A
(1 V to 3 V, 50 Ω)		10 Hz to 1 MHz 1 MHz to 10 MHz 10 MHz to 30 MHz 30 MHz to 50 MHz 50 MHz to 80 MHz 80 MHz to 100 MHz	0.071 % 0.11 % 0.21 % 0.47 % 0.96 % 1.3 %	Agilent 11049A
AC RESISTORS and CURRENT (20/E02)				
AC Current – Measuring Equipment Field calibrations available <small>Note 4</small>	0 μA to 220 μA	10 Hz to 20 Hz 20 Hz to 40 Hz	0.030 % + 16 nA 0.019 % + 10 nA	Fluke 5700A-EP

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Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty ($k=2$) <small>Note 3,5</small>	Remarks
		40 Hz to 1 kHz	0.015 % + 8 nA	
		1 kHz to 5 kHz	0.030 % + 12 nA	
		5 kHz to 10 kHz	0.11 % + 65 nA	
	0.22 mA to 2.2 mA	10 Hz to 20 Hz	0.030 % + 40 nA	
		20 Hz to 40 Hz	0.018 % + 35 nA	
		40 Hz to 1 kHz	0.013 % + 35 nA	
		1 kHz to 5 kHz	0.021 % + 110 nA	
		5 kHz to 10 kHz	0.11 % + 650 nA	
	2.2 mA to 22 mA	10 Hz to 20 Hz	0.039 % + 400 nA	
		20 Hz to 40 Hz	0.019 % + 350 nA	
		40 Hz to 1 kHz	0.014 % + 350 nA	
		1 kHz to 5 kHz	0.021 % + 550 nA	
		5 kHz to 10 kHz	0.11 % + 5 μ A	
	22 mA to 220 mA	10 Hz to 20 Hz	0.033 % + 4 μ A	
		20 Hz to 40 Hz	0.018 % + 3.5 μ A	
		40 Hz to 1 kHz	0.014 % + 2.5 μ A	
		1 kHz to 5 kHz	0.021 % + 3.5 μ A	
		5 kHz to 10 kHz	0.11 % + 10 μ A	
	0.22 A to 2.2 A	20 Hz to 1 kHz	0.027 % + 35 μ A	
		1 kHz to 5 kHz	0.046 % + 80 μ A	
		5 kHz to 10 kHz	0.70 % + 160 μ A	
	2.2 A to 11 A	40 Hz to 1 kHz	0.050 % + 170 μ A	Fluke 5700A-EP with 5725A
		1 kHz to 5 kHz	0.097 % + 380 μ A	
		5 kHz to 10 kHz	0.36 % + 750 μ A	
	11 A to 20.5 A	45 Hz to 100 Hz	0.095 % + 3.3 mA	Fluke 5520A
		100 Hz to 5 kHz	0.12 % + 3.3 mA	
		1 kHz to 5 kHz	2.3 % + 3.3 mA	
Extended Frequency Ranges Field calibrations available <small>Note 4</small>	29 μ A to 330 μ A	10 kHz to 30 kHz	1.2 % + 0.31 μ A	Fluke 5520A
	330 μ A to 3.3 mA	10 kHz to 30 kHz	0.78 % + 0.47 μ A	
	3.3 mA to 29 mA	10 kHz to 30 kHz	0.31 % + 3.1 μ A	

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Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty ($k=2$) <small>Note 3,5</small>	Remarks
Clamp-on Ammeter Toroidal Type Field calibrations available <small>Note 4</small>	29 mA to 330 mA	10 kHz to 30 kHz	0.31 % + 0.16 mA	
	20 A to 150 A	45 Hz to 65 Hz 65 Hz to 440 Hz	0.34 % + 30 mA 0.95 % + 50 mA	Fluke 5520A with 5500A/Coil
	150 A to 1000 A	45 Hz to 65 Hz 65 Hz to 440 Hz	0.38 % + 0.13 A 1.2 % + 0.23 A	
Clamp-on Ammeter Non-Toroidal Type Field calibrations available <small>Note 4</small>	20 A to 150 A	45 Hz to 65 Hz 65 Hz to 440 Hz	0.57 % + 0.29 A 1.0 % + 0.29 A	Fluke 5520A with 5500A/Coil
	150 A to 1000 A	45 Hz to 65 Hz 65 Hz to 440 Hz	0.60 % + 1 A 1.3 % + 1.1 A	
AC Current – Measure Field calibrations available <small>Note 4</small>	0 μ A to 100 μ A	10 Hz to 20 Hz 20 Hz to 45 Hz 45 Hz to 100 Hz 100 Hz to 5 kHz	0.5 % + 35 nA 0.17 % + 35 nA 0.072 % + 35 nA 0.072 % + 35 nA	Agilent 3458A opt 2
	100 μ A to 1 mA	10 Hz to 20 Hz 20 Hz to 45 Hz 45 Hz to 100 Hz 100 Hz to 5 kHz	0.46 % + 230 nA 0.17 % + 230 nA 0.071 % + 230 nA 0.038 % + 230 nA	
	1 mA to 10 mA	10 Hz to 20 Hz 20 Hz to 45 Hz 45 Hz to 100 Hz 100 Hz to 5 kHz	0.46 % + 2.3 μ A 0.17 % + 2.3 μ A 0.071 % + 2.3 μ A 0.038 % + 2.3 μ A	
	10 mA to 100 mA	10 Hz to 20 Hz 20 Hz to 45 Hz 45 Hz to 100 Hz 100 Hz to 5 kHz	0.46 % + 23 μ A 0.17 % + 23 μ A 0.071 % + 23 μ A 0.037 % + 23 μ A	
	100 mA to 1 A	10 Hz to 20 Hz 20 Hz to 45 Hz 45 Hz to 100 Hz 100 Hz to 5 kHz	0.46 % + 230 μ A 0.19 % + 230 μ A 0.097 % + 230 μ A 0.12 % + 230 μ A	

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Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty ($k=2$) ^{Note 3,5}	Remarks
	1 A to 20 A	50 Hz to 100 Hz 100 Hz to 300 Hz 300 Hz to 1 kHz 1 kHz to 3 kHz 3 kHz to 4 kHz 4 kHz to 5 kHz	0.023 % + 640 μ A 0.025 % + 220 μ A 0.034 % + 280 μ A 0.06 % + 540 μ A 0.075 % + 1.4 mA 0.09 % + 2.2 mA	Fluke Y5020 with Agilent 3458A opt 2

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) ^{Notes 1,2}

Measured Parameter or Device Calibrated	Range	Uncertainty ($k=2$) ^{Note 3,5}	Remarks
DC RESISTANCE and CURRENT (20/E05)			
DC Resistance – Measuring Equipment and Measure Field calibrations available ^{Note 4}	0 Ω to 10 Ω 10 Ω to 100 Ω 100 Ω to 1 k Ω 1 k Ω to 10 k Ω 10 k Ω to 100 k Ω 100 k Ω to 1 M Ω 1 M Ω to 10 M Ω 10 M Ω to 100 M Ω 100 M Ω to 1 G Ω 1 G Ω to 10 G Ω 10 G Ω to 100 G Ω 100 G Ω to 1 T Ω	18 $\mu\Omega/\Omega$ + 58 $\mu\Omega$ 15 $\mu\Omega/\Omega$ + 0.58 m Ω 12 $\mu\Omega/\Omega$ + 0.58 m Ω 12 $\mu\Omega/\Omega$ + 5.8 m Ω 12 $\mu\Omega/\Omega$ + 58 m Ω 19 $\mu\Omega/\Omega$ + 2.3 Ω 62 $\mu\Omega/\Omega$ + 0.12 k Ω 0.059 % + 1.2 k Ω 0.012 + 32 k Ω 0.012 + 480 k Ω 0.012 + 62 M Ω 0.016 + 15 G Ω	Agilent 3458A with Decade Resistor
DC Resistance – Measuring Equipment Field calibrations available ^{Note 4}	0.1 m Ω 1 m Ω 10 m Ω 100 m Ω	0.047 % 0.046 % 36 $\mu\Omega/\Omega$ 67 $\mu\Omega/\Omega$	Extended Arm Bridge Fixed Resistor
DC Current – Measuring Equipment and Measure Field calibrations available ^{Note 4}	0 μ A to 100 μ A 100 μ A to 1 mA 1 mA to 10 mA 10 mA to 100 mA 100 mA to 1 A	26 μ A/A + 5.8 nA 26 μ A/A + 5.0 nA 26 μ A/A + 58 nA 46 μ A/A + 0.58 μ A 130 μ A/A + 12 μ A	Agilent 3458A with Current Source

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Measured Parameter or Device Calibrated	Range	Uncertainty ($k=2$) <small>Note 3,5</small>	Remarks
DC Current – Measure	1 A to 20 A	36 μ A/A	Fluke Y5020 with Agilent 3458A opt 2
DC Current – Measuring Equipment	20 A to 100 A	0.046 %	
Field calibrations available <small>Note 4</small>	220 mA to 2.2 A 2.2 A to 11 A 11 A to 20.5 A	86 μ A/A + 12 μ A 0.036 % + 480 μ A 0.078 % + 580 μ A	Fluke 5700A-EP Fluke 5700A-EP with 5725A Fluke 5520A
Clamp-on Ammeter Non-Toroidal Type Field calibrations available <small>Note 4</small>	20 A to 150 A 150 A to 1000 A	0.53 % + 0.17 A 0.52 % + 0.58 A	Fluke 5520A with 5500A/Coil

DC VOLTAGE (20/E06)

DC Voltage – Measure Equipment Field calibrations available <small>Note 4</small>	0 V to 220 mV 220 mV to 2.2 V 2.2 V to 11 V 11 V to 22 V 22 V to 220 V 220 V to 1100 V	8.6 μ V/V + 0.4 μ V 5.4 μ V/V + 0.7 μ V 4 μ V/V + 2.5 μ V 4 μ V/V + 4 μ V 5.8 μ V/V + 40 μ V 7.6 μ A/V + 400 μ V	Fluke 5700A-EP
DC Voltage – Measure	0 mV to 100 mV 100 mV to 10 V 10 V to 100 V 100 V to 500 V 500 V to 800 V 800 V to 1000 V	7.1 μ V/V + 0.5 μ V 5.0 μ V/V + 0.5 μ V 7.6 μ V/V + 35 μ V 11 μ V/V + 120 μ V 17 μ V/V + 120 μ V 21 μ V/V + 120 μ V	Agilent 3458A opt 2
DC High Voltage – Measure and Measuring Equipment	1 kV to 2 kV 2 kV to 20 kV	0.051 % + 0.46 V V 0.049 % + 4.6 V	Vitrek 4600A w/HV Source Vitrek 4640A w/HV Source

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Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty ($k=2$) <small>Note 3,5</small>	Remarks
LF AC VOLTAGE (20/E09)				
AC High Voltage – Measure Field calibrations available <small>Note 4</small>	700 V to 2 kV	20 Hz to 100 Hz 100 Hz to 400 Hz	0.083 % + 2.3 V 0.47 % + 4.6 V	Vitrek 4600

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Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty ($k=2$) <small>Note 3,5</small>	Remarks
AC Voltage – Measure Field calibrations available <small>Note 4</small>	2 kV to 20 kV 0 mV to 10 mV 10 mV to 100 mV 100 mV to 1 V 1 V to 10 V 10 V to 100 V	20 Hz to 100 Hz 1 Hz to 40 Hz 40 Hz to 1 kHz 1 kHz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz 1 Hz to 40 Hz 40 Hz to 1 kHz 1 kHz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz 300 kHz to 1 MHz 1 MHz to 2 MHz 1 Hz to 40 Hz 40 Hz to 1 kHz 1 kHz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz 300 kHz to 1 MHz 1 Hz to 40 Hz 40 Hz to 1 kHz 1 kHz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz 300 kHz to 1 MHz 1 Hz to 40 Hz 40 Hz to 1 kHz 1 kHz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz 300 kHz to 1 MHz	0.28 % + 23 V 0.036 % + 3.5 μ V 0.024 % + 1.3 μ V 0.038 % + 1.3 μ V 0.12 % + 1.3 μ V 0.58 % + 1.3 μ V 4.6 % + 2.3 μ V 0.013 % + 5.1 μ V 0.0094 % + 2.3 μ V 0.017 % + 2.3 μ V 0.037 % + 2.3 μ V 0.093 % + 2.3 μ V 0.36 % + 12 μ V 1.2 % + 12 μ V 1.8 % + 12 μ V 0.0098 % + 46 μ V 0.0094 % + 23 μ V 0.017 % + 23 μ V 0.036 % + 23 μ V 0.093 % + 23 μ V 0.35 % + 120 μ V 1.2 % + 120 μ V 0.0095 % + 0.46 mV 0.0095 % + 0.23 mV 0.017 % + 0.230 mV 0.036 % + 0.230 mV 0.093 % + 0.23 mV 0.35 % + 1.2 mV 1.2 % + 1.2 mV 1.7 % + 1.2 mV 0.024 % + 4.6 mV	Agilent 3458A opt 2

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Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty ($k=2$) <small>Note 3,5</small>	Remarks
AC Voltage – Measuring Equipment Field calibrations available <small>Note 4</small>		40 Hz to 1 kHz 1 kHz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz 300 kHz to 1 MHz	0.024 % + 2.3 mV 0.024 % + 2.3 mV 0.041 % + 2.3 mV 0.14 % + 2.3 mV 0.46 % + 12 mV 1.7 % + 12 mV	
	100 V to 700 V	1 Hz to 40 Hz 40 Hz to 1 kHz 1 kHz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz	0.047 % + 46 mV 0.047 % + 23 mV 0.071 % + 23 mV 0.14 % + 23 mV 0.35 % + 23 mV	
	0 mV to 2.2 mV	10 Hz to 20 Hz 20 Hz to 40 Hz 40 Hz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz 300 kHz to 500 kHz 500 kHz to 1 MHz	0.17 % + 4 μ V 0.17 % + 4 μ V 0.1 % + 4 μ V 0.12 % + 4 μ V 0.17 % + 5 μ V 0.33 % + 10 μ V 0.47 % + 20 μ V 0.58 % + 20 μ V	Fluke 5700A-EP
	2.2 mV to 22 mV	10 Hz to 20 Hz 20 Hz to 40 Hz 40 Hz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz 300 kHz to 500 kHz 500 kHz to 1 MHz	0.044 % + 4 μ V 0.035 % + 4 μ V 0.02 % + 4 μ V 0.031 % + 4 μ V 0.059 % + 5 μ V 0.12 % + 10 μ V 0.16 % + 20 μ V 0.3 % + 20 μ V	
	22 mV to 220 mV	10 Hz to 20 Hz 20 Hz to 40 Hz 40 Hz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz	0.028 % + 12 μ V 0.017 % + 7 μ V 0.01 % + 7 μ V 0.021 % + 7 μ V 0.047 % + 17 μ V	

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Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty ($k=2$) <small>Note 3,5</small>	Remarks
		100 kHz to 300 kHz 300 kHz to 500 kHz 500 kHz to 1 MHz	0.092 % + 20 μ V 0.14 % + 25 μ V 0.28 % + 45 μ V	
	220 mV to 2.2 V	10 Hz to 20 Hz 20 Hz to 40 Hz 40 Hz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz 300 kHz to 500 kHz 500 kHz to 1 MHz	0.028 % + 40 μ V 0.016 % + 15 μ V 0.0063 % + 8 μ V 0.0081 % + 10 μ V 0.012 % + 30 μ V 0.043 % + 80 μ V 0.1 % + 200 μ V 0.18 % + 300 μ V	
	2.2 V to 22 V	10 Hz to 20 Hz 20 Hz to 40 Hz 40 Hz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz 300 kHz to 500 kHz 500 kHz to 1 MHz	0.028 % + 0.4 mV 0.016 % + 0.15 mV 0.0049 % + 50 μ V 0.0083 % + 0.1 mV 0.011 % + 0.2 mV 0.03 % + 0.6 mV 0.1 % + 2 mV 0.17 % + 3.2 mV	
	22 V to 220 V	10 Hz to 20 Hz 20 Hz to 40 Hz 40 Hz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz 100 kHz to 300 kHz 300 kHz to 500 kHz 500 kHz to 1 MHz	0.028 % + 4 mV 0.016 % + 1.5 mV 0.0069 % + 0.6 mV 0.0093 % + 1 mV 0.016 % + 2.5 mV 0.09 % + 16 mV 0.44 % + 40 mV 0.8 % + 80 mV	
	220 V to 1100 V	40 Hz to 1 kHz 1 kHz to 20 kHz 20 kHz to 30 kHz	0.011 % + 4 mV 0.017 % + 6 mV 0.061 % + 11 mV	Fluke 5700A-EP/5725A
	220 V to 750 V	30 kHz to 50 kHz	0.06 % + 11 mV	

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Measured Parameter or Device Calibrated	Range	Frequency Range	Uncertainty ($k=2$) <small>Note 3,5</small>	Remarks
		50 kHz to 100 kHz	0.23 % + 45 mV	
LF CAPACITANCE (20/E10)				
Capacitance – Measuring Equipment Field calibrations available <small>Note 4</small>	0.19 nF to < 1.1 nF 1.1 nF to < 3.3 nF 3.3 nF to < 11 nF 11 nF to < 110 nF 110 nF to < 330 nF 0.33 µF to < 1.1 µF 1.1 µF to < 3.3 µF 3.3 µF to < 11 µF 11 µF to < 33 µF 33 µF to < 110 µF 110 µF to < 330 µF 0.33 mF to < 1.1 mF 1.1 mF to < 3.3 mF 3.3 mF to < 11 mF 11 mF to < 33 mF 33 mF to < 110 mF	10 Hz to 10 kHz 10 Hz to 3 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz 10 Hz to 600 Hz 10 Hz to 300 Hz 10 Hz to 150 Hz 10 Hz to 120 Hz 10 Hz to 80 Hz DC to 50 Hz DC to 20 Hz DC to 6 Hz DC to 2 Hz DC to 0.6 Hz DC to 0.2 Hz	0.39 % + 7.8 pF 0.39 % + 7.8 pF 0.21 % + 7.8 pF 0.21 % + 78 pF 0.21 % + 0.23 nF 0.21 % + 0.78 nF 0.21 % + 2.3 nF 0.21 % + 7.8 nF 0.32 % + 23 nF 0.36 % + 78 nF 0.36 % + 0.23 µF 0.35 % + 0.78 µF 0.35 % + 2.3 µF 0.35 % + 7.8 µF 0.58 % + 23 µF 0.85 % + 78 µF	Fluke 5520A
LF POWER/ENERGY (20/E12)				
Power – Measuring Equipment DC Power 0.33 mA to 330 mA	11 µW to 1.1 mW 1.1 mW to 110 mW 0.11W to 110 W 110 W to 330 W	DC DC DC DC	0.024 % 0.027 % 0.024 % 0.018 %	Fluke 5520A
0.33 A to 3 A	11 W to 110 mW 0.11 W to 990 W 1 W to 3 kW	DC DC DC	0.044 % 0.053 % 0.0096 %	
3 A to 20.5 A	0.099 W to 0.99 W 0.99 W to 6.8 kW 6.8 W to 20.5 kW	DC DC DC	0.088 % 0.07 % 0.04 %	

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AC Power <small>Note 8</small> (PF = 1) 3.3 mA to 9 mA	0.11 mW to 3 mW 3 mW to 9 W	10 Hz to 65 Hz 10 Hz to 65 Hz	0.13 % 0.077 %	
9 mA to 33 mA	0.3 mW to 10 mW 10 mW to 33 W	10 Hz to 65 Hz 10 Hz to 65 Hz	0.089 % 0.077 %	
33 mA to 90 mA	1 mW to 30 mW 30 mW to 90 W	10 Hz to 65 Hz 10 Hz to 65 Hz	0.071 % 0.057 %	
90 mA to 330 mA	3.0 mW to 100 mW 100 mW to 300 W	10 Hz to 65 Hz 10 Hz to 65 Hz	0.089 % 0.078 %	
0.33 A to 0.9 A	11 mW to 300 mW 300 mW to 900 W	10 Hz to 65 Hz 10 Hz to 65 Hz	0.071 % 0.081 %	
0.9 A to 2.2 A	30 mW to 720 mW 720 mW to 2 kW	10 Hz to 65 Hz 10 Hz to 65 Hz	0.089 % 0.079 %	
2.2 A to 4.5 A	80 mW to 1.4 W 1.4 W to 4.5 kW	10 Hz to 65 Hz 10 Hz to 65 Hz	0.088 % 0.18 %	
4.5 A to 20.5 A	150 mW to 6.7 W 6.7 W to 20 kW	10 Hz to 65 Hz 10 Hz to 65 Hz	0.17 % 0.17 %	

PHASE METERS (20/E15)

Phase Meters – Measure Equipment Field calibrations available <small>Note 4</small>	0° to 179.99°	10 Hz to 65 Hz 65 Hz to 500 Hz 500 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz 10 kHz to 30 kHz	0.11° 0.20° 0.40° 1.9° 3.9° 7.8°	Fluke 5520A
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TIME and FREQUENCY				
FREQUENCY DISSEMINATION (20/F01)				
Frequency – Source and Measure In-Lab	10 MHz		3.7 x 10 ⁻¹²	Fluke 910R
Field <small>Note 4</small>	10 MHz		3.8 x 10 ⁻⁹	Agilent 8648C
OSCILLATOR CHARACTERIZATION (20/F03)				
Total Harmonic Distortion	0.01 % to 100 %	20 Hz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz	13 % 21 % 37 %	Agilent 339A

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PULSE WAVEFORM (20/F04)			
Rise Time – Generate Field calibrations available <small>Note 4</small>	≥ 300 ps	6.0 ps	Fluke 5520A SC1100
Rise Time – Measure	≥ 800 ps	0.13 % + 170 ps	Tektronix TDS 510A
MECHANICAL			
FORCE (20/M06) Force Measuring Equipment – Tension and Compression	1 lbf to 50 lbf 50 lbf to 250 lbf 1 ggf to 4 kgf	0.013 % 0.0044 % + 0.0065 lbf 0.013 %	Dead Weight
TORQUE (20/M15)			
Torque – Measure Field calibrations available <small>Note 4</small>	20 ozf-in to 600 lbf-ft	0.65 %	Torque Calibrator
WEIGHING INSTRUMENTS (20/M16)			
Balances - Metric	2 kg	6 mg	Class S Weights

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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	Range	Uncertainty ($k=2$) <small>Note 3,5</small>	Remarks
Field calibrations available <small>Note 4</small>	1 kg 500 g 200 g 100 g 50 g 20 g 10 g 5 g 2 g 1 g	3 mg 1.4 mg 0.6 mg 0.3 mg 150 µg 88 µg 59 µg 40 µg 40 µg 40 µg	
Balances - Avoirdupois	1 lb to 400 lb	0.012 %	NIST Class F Weights

THERMODYNAMIC

LABORATORY THERMOMETERS (20/T03)

Temperature – Measuring Equipment Field calibrations available <small>Note 4</small>	0°C to 100 °C	0.023 °C	Hart 5628 w/Dry Block
Temperature – Measure Field calibrations available <small>Note 4</small>	-195°C to 0 °C 0°C to 420 °C 420°C to 600 °C	0.012 °C 0.026 °C 0.036 °C	Hart 5628

PRESSURE (20/T05)

Absolute Pressure – Source (Pneumatic) Field calibrations available <small>Note 4</small>	0 psia to 25 psia 25 psia to 500 psia	0.0019 psia 0.0065 % + 0.001 psia	Ruska 7250xi
Gage Pressure – Source (Pneumatic) Field calibrations available <small>Note 4</small>	-15 psig to 25 psig 25 psig to 500 psig	0.0017 psig 0.0065 %	Ruska 7250xi
Gage Pressure – Source (Hydraulic) Field calibrations available <small>Note 4</small>	0 psig to 1500 psig 1500 psig to 15 000 psig	0.36 psi 0.023 %	Fluke RPM4-E-DWT

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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	Range	Uncertainty ($k=2$) <small>Note 3,5</small>	Remarks
RADIATION THERMOMETRY (20/T06)			
Infrared Temperature – Measuring Equipment	-15 to 0 C 0 to 50 C 50 to 100 C 100 to 120 C 120 to 200 C 200 to 350 C 350 to 500 C	0.79 °C 0.54 °C 0.67 °C 0.74 °C 0.95 °C 1.7 °C 2.2 °C	Fluke Black Body
THERMOCOUPLES (20/T08)			
Electrical Calibration of Thermocouple Devices Field calibrations available <small>Note 4</small>			
E	-250 to -100 -100 to -25 -25 to 350 350 to 650 650 to 1000	0.39 °C 0.12 °C 0.11 °C 0.12 °C 0.16 °C	Fluke 5520A
J	-210 to -100 -100 to -30 -30 to 150 150 to 760 760 to 1200	0.21 °C 0.13 °C 0.11 °C 0.13 °C 0.18 °C	
K	-200 to -100 -100 to 25 -25 to 120 120 to 1000 1000 to 1372	0.26 °C 0.14 °C 0.13 °C 0.20 °C 0.31 °C	
T	-250 to -150 -150 to 0 0 to 120 120 to 400	0.49 °C 0.19 °C 0.13 °C 0.11 °C	

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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	Range	Uncertainty ($k=2$) <small>Note 3,5</small>	Remarks
R	0 to 250	0.44 °C	
	250 to 400	0.27 °C	
	400 to 1000	0.26 °C	
	1000 to 1767	0.31 °C	
S	0 to 250	0.37 °C	
	250 to 1000	0.28 °C	
	1000 to 1400	0.29 °C	
	1400 to 1767	0.36 °C	
N	-200 to -100	0.31 °C	
	-100 to -25	0.17 °C	
	-25 to 120	0.15 °C	
	120 to 410	0.14 °C	
	410 to 1300	0.21 °C	

END

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Notes

Note 1: A Calibration and Measurement Capability (CMC) is a description of the best result of a calibration or measurement (result with the smallest uncertainty of measurement) that is available to the laboratory's customers under normal conditions, when performing more or less routine calibrations of nearly ideal measurement standards or instruments. The CMC is described in the laboratory's scope of accreditation by: the measurement parameter/device being calibrated, the measurement range, the uncertainty associated with that range (see note 3), and remarks on additional parameters, if applicable.

Note 2: Calibration and Measurement Capabilities are traceable to the national measurement standards of the U.S. or to the national measurement standards of other countries and are thus traceable to the internationally accepted representation of the appropriate SI (Système International) unit.

Note 3: The uncertainty associated with a measurement in a CMC is an expanded uncertainty using a coverage factor, $k = 2$, with a level of confidence of approximately 95 %. Units for the measurand and its uncertainty are to match. Exceptions to this occur when marketplace practice employs mixed units, such as when the artifact to be measured is labeled in non-SI units and the uncertainty is given in SI units (Example: 5 lb weight with uncertainty given in mg).

Note 3a: The uncertainty of a specific calibration by the laboratory may be greater than the uncertainty in the CMC due to the condition and behavior of the customer's device and specific circumstances of the calibration. The uncertainties quoted do not include possible effects on the calibrated device of transportation, long term stability, or intended use.

Note 3b: As the CMC represents the best measurement results achievable under normal conditions, the accredited calibration laboratory shall not report smaller uncertainty of measurement than that given in a CMC for calibrations or measurements covered by that CMC.

Note 3c: As described in Note 1, CMCs cover calibrations and measurements that are available to the laboratory's customers under *normal conditions*. However, the laboratory may have the capability to offer special tests, employing special conditions, which yield calibration or measurement results with lower uncertainties. Such special tests are not covered by the CMCs and are outside the laboratory's scope of accreditation. In this case, NVLAP requirements for the labeling, on calibration reports, of results outside the laboratory's scope of accreditation apply. These requirements are set out in Annex A.1.h. of NIST Handbook 150, Procedures and General Requirements.

Note 4: Uncertainties associated with field service calibration may be greater as they incorporate on-site environmental contributions, transportation effects, or other factors that affect the measurements. (This note applies only if marked in the body of the scope.)

Note 5: Values listed with percent (%) are percent of reading or generated value unless otherwise noted.

Note 6: NVLAP accreditation is the formal recognition of specific calibration capabilities. Neither NVLAP nor NIST guarantee the accuracy of individual calibrations made by accredited laboratories.

Note 7: See [NIST Handbook 150](#) for further explanation of these notes.

Note 8: The uncertainties shown are for the most favorable conditions. There is an increase in uncertainty that corresponds to the laboratory's AC voltage and current uncertainties at different frequencies other than the ones shown. Power factors (PF) other than the one shown contribute to the power uncertainty. PF is related to the cosine of phase. Therefore, uncertainties track the laboratory's phase uncertainty closely at PF near one, but are magnified heavily as PF approaches zero. The lab may also report reactive power, apparent power, and power factor under this accreditation. If needed, contact laboratory for more information regarding uncertainties at frequency and power factor combinations other than the ones shown.

Note 9: Where L is used, it is the numeric value of the length of the device under tested in the same unit shown in the range.

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